

Application No. 10/776,966
Amendment dated August 3, 2005
Reply to Office Action of February 9, 2005

Amendments to the Claims

This listing of claims will replace all prior versions, and listing, of claims in the application:

Listing of Claims:

1. (Currently Amended) A heating apparatus comprising:
 - a heating head for emanating heat thereabout and having a central, longitudinal axis extending therethrough;
 - a burner assembly for igniting fuel from a fuel source and generating hot combustion gases;
 - a plurality of elongate flue chambers extending along the head axis through which the hot combustion gases travel;
 - external and internal wall portions of the head that are of a predetermined material and cooperate to form the flue chambers; and
 - insulation material that is distinct from the material of the wall portions disposed against and along the head internal wall portions so that the insulation material maximizes heat transfer from the hot combustion gases radially outward to the external wall portions and minimizes heat transfer radially inward from the inner wall portions.
2. (Original) The heating apparatus of claim 1 wherein the external and internal wall portions are spaced to keep the flue chambers sized to provide for turbulent flow of the combustion gases traveling therethrough.
3. (Original) The heating apparatus of claim 1 wherein the head is sized along the axis thereof and the head outer wall portions are of a predetermined material selected to radiate substantially infrared heat energy.

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4. (Original) The heating apparatus of claim 1 including an elongate support on which the head is mounted so that the central axis thereof is aligned with the support to provide the heating apparatus as a patio heater of a predetermined axial length with the head above ground level.
5. (Original) The heating apparatus of claim 4 wherein the head has a predetermined length equal or greater than approximately one quarter of the predetermined length of the patio heater.
6. (Original) The heating apparatus of claim 4 including a downwardly opening dome on top of the heating head to reflect stray heat energy downwardly about the head and elongate support therefor.
7. (Original) The heating apparatus of claim 1 wherein the external and internal wall portions engage each other to substantially isolate gas flow in each flue chamber from gas flow in other flue chambers.
8. (Original) The heating apparatus of claim 7 wherein the head includes an inner, generally cylindrical wall including the inner wall portions, and an outer wall including the outer wall portions and being configured to generally include peaks spaced from the inner wall portions and valleys engaged with the inner wall portions.
9. (Original) The heating apparatus of claim 8 wherein the peaks of the outer wall portions are curved or angled.

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10. (Original) The heating apparatus of claim 8 wherein the inner wall includes an inner surface with the insulation material thereon.

11. (Currently Amended) A heating apparatus comprising:
a heating head for emanating heat thereabout and having a central longitudinal axis extending therethrough;
a burner assembly for igniting fuel from a fuel source and generating hot combustion gases; [and]

a plurality of substantially isolated flue chambers spaced about the head and extending along the head axis, the isolated flue chambers being configured to confine flow of the combustion gases therein to generate turbulent flow for maximizing heat transfer from the gas flow to the heating head[.];

a dome cover member over the heating head extending radially outward from the central axis and downward along the heating head for reflecting stray radiant heat generated by the head;

an open top of the heating head to avoid generating excessive heat energy via the turbulent flow of combustion gases in the flue chambers; and

a vertical space between the dome cover member and open top of the head to permit the combustion gases to escape therefrom.

12. (Original) The heating apparatus of claim 11 wherein the burner assembly has a predetermined feed rate of fuel supplied thereto that is kept to a minimum.

13. (Original) The heating apparatus of claim 11 wherein the burner assembly includes small gas orifices sized at approximately 52 or 54 gauge.

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14. (Original) The heating apparatus of claim 11 wherein the burner assembly employs a predetermined energy input that is kept to a minimum.

15. (Original) The heating apparatus of claim 14 wherein the predetermined energy input is approximately 20,000 BTU/hr.

16. (Original) The heating apparatus of claim 11 wherein the heating head includes:
a tubular shaped inner wall having the central longitudinal axis extending therethrough and an outer surface, and
a generally tubular outer wall disposed coaxially outside the inner wall, the outer wall having an undulated configuration comprising alternating upraised portions and intervening lands, where the upraised portions have interior surfaces and the lands contact the outer surface of the inner wall to form the plurality of substantially isolated flue chambers defined between the interior surfaces of the upraised portions and the outer surface of the inner wall.

17. (Original) The heating apparatus of claim 11, wherein the outer wall is of a predetermined material selected so that when heated the outer wall emits 30% or more of heat input into the burner assembly as radiant energy in the infrared (IR) region of the electromagnetic spectrum.

18. (Original) The heating apparatus of claim 11, wherein the exterior surface of the outer wall comprises a layer of aluminum or a carburized surface region of steel.

19. (Original) The heating apparatus of claim 11, wherein the exterior surface of the outer wall is constructed to emit electromagnetic radiation predominantly of wavelengths of 0.7 μm to 1000 μm in wavelength.

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20. (Original) The heating apparatus of claim 11, further comprising an elongate support member extending upwardly along the longitudinal axis to the heating head to space the head from ground level with the isolated flue chambers allowing the heating head to be maximized in size along the longitudinal axis and the support member to be minimized in size along the longitudinal axis.
21. (Original) The heating apparatus of claim 11, wherein the heating head includes insulative material disposed radially within the inner wall to minimize heat radiation radially inward from the inner wall.